

EAFM Risk Element Definitions – Draft 9/12/17

RISK ELEMENT	RISK TO WHAT? WHY DO WE CARE?	INDICATORS?	DEFINITION			
			Low	Low/Moderate	High/Moderate	High
BIOLOGICAL						
F status (fishing mortality)	Risk of not achieving OY, an MSFCA mandate	F ref points from current assessments	$F < F_{msy}$	Not used	Unknown	$F > F_{msy}$
Biomass status	Risk of depleting stock such that OY cannot be achieved, an MSFCA mandate	B, B ref from current assessment and history	$B > B_{msy}$	$B_{msy} > B > 0.5B_{msy}$	Unknown	$B < 0.5B_{msy}$
Assessment Type	Risk of not achieving OY due to scientific uncertainty based on analytical limitations	Categories with data inputs, key uncertainties listed?	Statistical catch at age	Swept area/index based/no ref pts	Not used	Data limited methods toolbox
Food Web/Trophic Interactions Between MAFMC-managed species	Risk of not achieving OY due to species interactions between MAFMC managed species	NOAA Food web model can be used to develop thresholds: "important" predator can be defined as something that causes >10%, >20% of species mortality for example, but depends on Council intent for these elements	Few interactions with other MAFMC managed spp	Important predator of other managed spp	Important prey of other managed spp	Managed species either exclusively dependent on other MAFMC managed species as prey or is sole prey for other MAFMC managed species
Food web/trophic interactions between MAFMC-managed species and Protected Species	Risk of not achieving OY due to interactions with protected species? Risk of not achieving protected species recovery objectives? Risk of fishery limitations due to protected species interactions?	NOAA Food web model and updated marine mammal diet information; see threshold suggestion above	Few interactions between protected and managed spp	Managed species is an important predator of protected species	Managed species is an important prey of protected species	Managed species either exclusively dependent on protected species as prey or is sole prey for protected species
Food web/trophic interactions between MAFMC-managed species and Forage Species	Risk of not achieving OY due to interactions with non-MAFMC managed forage?	NOAA food web model and diet info in, Forage white paper, unmanaged forage amendment analyses; see threshold suggestion above	Few interactions between non-MAFMC managed forage fish and managed spp	Managed species is an important predator of non-MAFMC managed forage species (need to assign a threshold for predator dependence and or show that all other forage is limiting, or this will always be true and therefore rather meaningless)	Managed species is an important prey of non-MAFMC managed forage species	Managed species either exclusively dependent on non-MAFMC managed forage species as prey or is sole prey for non-MAFMC managed forage species
Community interactions	Need to define risk element	Need to define risk element	No change in community interactions	cannot determine without definition	cannot determine without definition	cannot determine without definition

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Changes (particularly reduction) in diversity	Risk of not achieving OY due to reduced diversity in the ecosystem?	Need to define level to apply risk element: system diversity? diversity within the habitat occupied by the species of interest? diversity within the trophic level of the species of interest? NOAA Indicator Data available for all surveyed species in the region	No trend in diversity measure	Significant long term trend (either direction) in diversity measure	Significant recent increasing trend in diversity measure. Could define as most recent 10 years survey expected number of species	Significant recent downward trend in diversity measure. Could define as most recent 10 years survey expected number of species
Climate	Risk of not achieving OY due to species overall sensitivity to expected climate change impacts in the NE US	Northeast Vulnerability Assessment (Hare et al 2016)	lowest risk	moderate risk	high risk	very high risk
Distribution Shifts	Risk of not achieving OY due to climate-driven distribution shifts in the NE US	Kernel density maps by species, distance & depth time series; Northeast Vulnerability Assessment (Hare et al 2016)	lowest risk	moderate risk	high risk	very high risk
<u>HABITAT</u>	Risk of not achieving OY due to inadequate estuarine habitat/nursery grounds	Primarily estuarine habitat quality considered: e.g. are there water quality concerns in Chesapeake and Delaware Bays?	Not a concern; could be modified as below	not used, could be modified as below	not used, could be modified as below	A concern, could be modified as below
Biological	Risk of not achieving OY due to inadequate biological habitat?	Need to define risk element: what do we mean by biological habitat?	No trend in biological habitat	Significant long term decrease in habitat quality/quantity	Significant long term decrease in habitat quality/quantity	Significant recent decrease in habitat quality/quantity
Physical	Risk of not achieving OY due to inadequate physical habitat? (some may be included in overall climate impacts above so may be double counting?)	Need to define risk element: what do we mean by physical habitat?	No trend in physical habitat	Significant long term decrease in habitat quality/quantity	Significant long term decrease in habitat quality/quantity	Significant recent decrease in habitat quality/quantity
Ocean acidification	Risk of not achieving OY due to ocean acidification impacts? (these are included in overall climate impacts, may be double counting?)	OA risk included in the climate vulnerability analysis, time series of pH measurements				
<u>ECONOMIC METRICS</u>						
Recreational (including for-hire and individual)						
Employment	Risk to equitable distribution of value? Risk to having "enough" fishing-related jobs? Need to clarify.	Fisheries of the U.S.-state (or regional) level	No trend in employment	Significant long term decrease in employment	Significant long term decrease in employment	Significant recent decrease in employment

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Revenue/Value/Angler-days	Risk of not maximizing fishery value	Angler days	No trend in angler days	Significant long term decrease in angler days	Significant long term decrease in angler days	Significant recent decrease in angler days
Commercial						
Employment	Risk to equitable distribution of value? Risk to having "enough" fishing-related jobs? Need to clarify.	Fisheries of the U.S.-state level	No trend in employment	Significant long term decrease in employment	Significant long term decrease in employment	Significant recent decrease in employment
Profit	Risk of not maximizing fishery value	Commercial Revenue	No trend in revenue	Significant long term revenue decrease	Significant long term revenue decrease	Significant recent decrease in revenue
Commercial fleet diversity/business stability (need to define)	Risk to equitable access? Risk to resilience/stability? Need to clarify.	Individual-level, fleet level, other metric?	No trend in fleet diversity	Significant long term decrease in fleet diversity	Significant long term decrease in fleet diversity	Significant recent decrease in fleet diversity
Access to capital for fisheries businesses	Risk to equitable access? Risk to resilience/stability? Need to clarify.	Potential for derivation from NEFSC cost survey, but would require substantial work & time	No trend in access to capital	Significant long term decrease in access to capital	Significant long term decrease in access to capital	Significant recent decrease in access to capital
Insurance availability for fisheries businesses	Risk to equitable access? Risk to resilience/stability? Need to clarify.	Unknown	No trend in access to insurance	Significant long term decrease in access to insurance	Significant long term decrease in access to insurance	Significant recent decrease in access to insurance
Support infrastructure (for commercial and recreational sectors)	Risk to market access? Risk of not maximizing fishery value? Need to clarify.	Bureau of Labor Statistics Quarterly Census of Employment and Wages (2001 - 2006)	No trend in support infrastructure	Significant long term decrease in support infrastructure	Significant long term decrease in support infrastructure	Significant recent decrease in support infrastructure
Risk of the loss of emerging fishing opportunities	Risk to equitable access? Risk to resilience/stability? Need to clarify.		No trend in emerging fishing opportunities	Significant long term decrease in emerging fishing opportunities	Significant long term decrease in emerging fishing opportunities	Significant recent decrease in emerging fishing opportunities
FOOD PRODUCTION						
Commercial Landings	Risk to food security? Risk of unethical usage of fish? Need to clarify.	Commercial Fisheries Dealer database	No trend in seafood production	Significant long term decrease in seafood production	Significant long term decrease in seafood production	Significant recent decrease in seafood production
Recreational Landings (personal consumption/protein)	Risk to food security? Need to clarify.	MRIP/MRFFS	No trend in seafood consumption	Significant long term decrease in seafood consumption	Significant long term decrease in seafood consumption	Significant recent decrease in seafood consumption
Seafood safety	Risk to market access? Risk to food security? Need to clarify.	?	No trend in seafood safety	Significant long term decrease in seafood safety	Significant long term decrease in seafood safety	Significant recent decrease in seafood safety
SOCIAL						
Social diversity (Recreational/Commercial fishing community dependence) particularly loss of diversity.	Risk to community resilience?	NOAA-plans to calculate recreational/commercial fishery dependence across time;	No trend in community dependence	Significant long term increase in community dependence	Significant long term decrease in community dependence	Significant recent decrease in community dependence

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Shoreline Development	Risk to infrastructure? Is this different than support infrastructure above?	Measures of gentrification pressure				
MANAGEMENT						
Management control (catch measurement and monitoring)	Risk of not achieving OY, an MSFCA mandate? Clarification needed.	Actual catch v quota allocated	No history of overages	Small overages, but infrequent	Routine overages, but small to moderate	Routine significant overages
Vulnerability to other human uses (offshore energy development, etc.).	Risk to biological access? Risk of non-fishing mortality events? Need to clarify.	Do historical fishing areas overlap with energy development locations;	No overlap	Low to moderate overlap	Moderate to high overlap	High overlap; energy development could seriously disrupt fishery
Regulatory complexity/Levels of Compliance	Complex regulations may lead to non-compliance	Relate to overage performance	Simple regulations	Regulations of low to moderate complexity	Moderate to high complexity	High complexity
Regulatory structure (need to define)	Risk of not achieving OY, an MSFCA mandate? Clarification needed.	Simple or complex?	MAFMC only	Joint management with NEFMC	Joint management with ASMFC	Joint management with US partners and international issues
Discards	Risk of not achieving OY, an MSFCA mandate? Clarification needed.	SBRM based discard estimates	Not a concern	Low but not a concern	A concern but managed	A concern and difficult to control
Interactions with protected species	Compliance with MMPA	Species/fisheries regulated by MMPA Take Reduction Plan	Not a concern	Low but not a concern	Takes in fishery but total below PBR	Takes in fishery and total above PBR
Allocation			Not difficult	Low to moderate difficulty	Moderately difficult	Very difficult/controversial